

WHAT IS CLAIMED IS:

1. An adsorbent composition comprising a modified carbonaceous material capable of adsorbing an adsorbate wherein at least one organic group is attached to said [modified] carbonaceous material.

5 2. The adsorbent composition of claim 1, wherein said organic group is $(C_6H_4)-SO_3Na^+$, $(C_6H_4)-SO_3Li^+$, or $(C_6H_4)SO_3K^+$.

3. The adsorbent composition of claim 1, wherein said organic group is $p-C_6H_4SO_2NH_2$ or $-C_6H_4NH_2$.

10 4. The adsorbent composition of claim 1, wherein said organic group is hydrophilic.

5. The adsorbent composition of claim 1, wherein said modified carbonaceous material is activated carbon or carbon black.

15 6. A method to increase the adsorption capacity of a carbonaceous material capable of adsorbing an adsorbate comprising attaching to said carbonaceous material at least one organic group capable of increasing said adsorption capacity.

7. The method of claim 6, wherein said carbonaceous material is activated carbon or carbon black.

8. The method of claim 6, wherein said organic group is $(C_6H_4)-SO_3^-Na^+$, $(C_6H_4)-SO_3^-Li^+$, or $(C_6H_4)SO_3^-K^+$.

9. The method of claim 6, wherein said organic group is $p-C_6H_4SO_2NH_2$ or $-C_6H_4NH_2$.

10. The method of claim 6, wherein said organic group is hydrophilic.

11. The method of claim 6, wherein said adsorbate is polar.

12. The method of claim 6, wherein said adsorbate is water, ammonia, carbon dioxide, sulfur dioxide, or hydrogen sulfide.

13. The method of claim 12, wherein said adsorbate is water.

14. The method of claim 6, wherein said adsorbate is non-polar.

15. The method of claim 14, wherein said adsorbate is argon, oxygen, or methane.

16. The method of claim 6, wherein said adsorbate is in the gas or vapor phase.

17. The method of claim 6, wherein said adsorbate is in the liquid phase.

18. A method to adsorb an adsorbate comprising contacting said adsorbate with a modified carbonaceous material capable of adsorbing said adsorbate wherein at least one organic group is attached to said modified carbonaceous material.

19. The method of claim 18, wherein said modified carbonaceous material is activated carbon or carbon black.

20. The method of claim 18, wherein said organic group is $(C_6H_4)-SO_3^-Na^+$, $(C_6H_4)-SO_3^-Li^+$, or $(C_6H_4)SO_3^-K^+$.

21. The method of claim 18, wherein said organic group is $p-C_6H_4SO_2NH_2$ or $-C_6H_4NH_2$.

22. The method of claim 18, wherein said organic group is hydrophilic.

23. The method of claim 18, wherein said adsorbate is polar.

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24. The method of claim 18, wherein said adsorbate is water, ammonia, carbon dioxide, hydrogen sulfide, argon, oxygen, or methane.

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25.

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The method of claim 24, wherein said adsorbate is water.

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26. The adsorbent composition of claim 1, wherein said organic group contains an exchangeable ion.

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27. An ion exchange material comprising the adsorbent composition of claim 26.

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